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FARMERS' BULLETIN No. 310.

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# A SUCCESSFUL ALABAMA DIVERSI- FICATION FARM.

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## LETTER OF TRANSMITTAL.

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U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF PLANT INDUSTRY,  
OFFICE OF THE CHIEF,  
*Washington, D. C., September 4, 1907.*

SIR: I have the honor to transmit herewith a paper entitled "A Successful Alabama Diversification Farm," in which an account is given of the work done jointly by Mr. M. A. Crosby, Assistant Agriculturist, Farm Management Investigations, Bureau of Plant Industry, Prof. J. F. Duggar, Director of the Agricultural Experiment Station of the Alabama Polytechnic Institute, and Prof. W. J. Spillman, Agriculturist in Charge of Farm Management Investigations. The paper gives an account of the first three years' work on the diversification farm on the plantation of Gen. T. T. Munford. I respectfully recommend that it be issued as a Farmers' Bulletin.

Respectfully,

B. T. GALLOWAY,  
*Chief of Bureau.*

Hon. JAMES WILSON,  
*Secretary of Agriculture.*

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## A SUCCESSFUL ALABAMA DIVERSIFICATION FARM.

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### INTRODUCTION.

In this bulletin is given the record of a 65-acre hog farm in the black prairie region of Alabama. The method of farming described is applicable to the entire area in which corn, alfalfa, and Bermuda grass can be grown. This area includes the black lands of Texas, the river bottoms of Missouri, Arkansas, Louisiana, and Mississippi, and the alluvial soils generally in all the Southern States. This method is especially adapted to the large area in Alabama and Mississippi known as the "black belt," in which the soil is peculiarly suited to alfalfa, and with only slight modification it is applicable to the whole area over which alfalfa or clover may be grown in this country. The primary object in the work of this farm was to demonstrate that hog farming is practicable in this territory, and three years' experience has led us to the conclusion that the production of alfalfa hay in this region can also be made highly profitable.

Alfalfa is not only adapted to the territory named, but succeeds on alluvial soils throughout the Southern States. The contents of this bulletin should therefore be of special interest to farmers in the river bottoms.

The system of farming established on the diversification farm at Uniontown, Ala., was planned with the special view of increasing the fertility of the soil and reducing the cost of tillage by doing away with hillside ditches and adopting improved methods of cultivation. Although on an average only 55 acres have been devoted to cultivated crops, the remainder being a worn-out hill, about 6 acres of which is in Bermuda grass, the farm has yielded in the three years a net profit of \$2,320.39, or \$773.46 a year. This is an average yearly profit of \$11.90 an acre on land valued at \$20 an acre.

The farm, designated as Diversification Farm No. 3, is located in what is known as the canebrake or black-prairie region of central Alabama. It is a portion of the 2,300-acre plantation of Gen. Thomas T. Munford. For several years this plantation has been under the management of Mr. William Munford, being devoted chiefly to the

production of cotton. Mr. Munford has also had active charge of the diversification farm, and any success that has been met with is largely due to his good management and faithfulness in carrying out plans.

### SOIL.

In contour the land of the black prairie belt varies from level to quite rolling. The soil is a brown, reddish-brown, black, or gray limestone clay.<sup>a</sup> It is classified by the Bureau of Soils as Houston clay and Houston black clay, the former occurring on the rolling, hilly portions and the latter in the valleys and level areas. The Houston black clay is deeper and much more productive than the Houston clay.

When wet this soil becomes very plastic and sticky. When very dry it cracks, some of the fissures being 1 or 2 inches across and from 2 to 3 feet deep. If plowed when dry, the soil breaks up into huge clods. With the first rains, however, these clods disintegrate like slaking lime.

This is naturally a very productive soil, but a continual cropping for seventy-five or eighty years with cotton, and occasionally a little corn, has greatly exhausted the humus or vegetable matter on the more rolling land and correspondingly reduced its producing capacity. For this reason there is great need of a more diversified system of farming—one which will add humus to the soil and restore the land to its original state of fertility.

In selecting the site for this farm care was taken to choose an area which would fairly represent the average land of the surrounding country, so that any results obtained could not be credited to peculiar soil or other abnormal conditions.

The soil on this diversification farm, with the exception of about 2 acres of Houston black clay in the northeast corner, practically all belongs to the Houston clay type. It is locally known as poor hill land to distinguish it from the richer and more productive bottom lands. Four years ago one-third of a bale of cotton and from 15 to 18 bushels of corn to the acre would have been considered an average yield.

### TYPE OF FARMING.

The farm described in this bulletin was established to determine whether pork could be produced on the plantation at a profit to the owner. Throughout the cotton-growing sections of the Southern States

<sup>a</sup> It is said that this soil owes its origin to a cretaceous sediment laid down in a rapidly deepening sea. It is known as the rotten limestone or Selma chalk formation, practically the whole area being underlaid at varying depths with a rotten limestone. Ledges of a more resistant lime rock outcrop on many of the ridges. The soil is full of shells and sharks' teeth and of vertebræ and other fossil remains of marine life.

pork is the chief article of food consumed by the colored laborer, but as the bulk of it comes from the great corn belt of the North and West the amount required on a large plantation represents a considerable outlay of cash each year. The production of this meat on the plantation where it is consumed means not only a saving in actual cash outlay, but also necessitates the growing and feeding of a large quantity of forage, the surest and quickest way of increasing the fertility of the land.

Owing to the deficiency of humus in the soil, it was necessary to adopt a cropping system which would supply this essential constituent and at the same time furnish the feed required by the hogs. A rotation was planned with the view of building up the soil rather than of securing the maximum yields of any crops other than those necessary for the maintenance and fattening of the hogs.

### ROTATION.

A four-year rotation with alfalfa two years and corn and cowpeas two years in succession was decided upon. The alfalfa is sown early in the spring, cut for hay the first year, pastured by the hogs the second year, and then broken up for corn, the corn to be followed each time with cowpeas, the latter being sown broadcast ahead of the cultivators at the last working of the corn and grazed off by hogs after the corn has been harvested. In addition a few acres were set aside for such crops as sorghum and peanuts for soiling and pasture. This rotation provides for the turning under of a leguminous crop each time the land is broken; first the alfalfa, then the cowpeas, which follow the corn. Ten acres of cotton were grown the first year for a money crop to offset any loss that might occur from the change of system.

Alfalfa is not generally considered a suitable crop to utilize in a short rotation, and ordinarily it would not be recommended for such use, particularly when a maximum yield of hay is one of the objects sought. But in this case, where the yield of hay was a secondary consideration as compared to the production of hog feed and the building up of the soil, alfalfa suited the purpose admirably. The results obtained the past year (1906) from plowing up a 2-year-old stand of alfalfa for corn indicate quite clearly that, in this section at least, alfalfa can be utilized to good advantage in a comparatively short rotation.

It is planned to continue this rotation only until each field has had one crop of alfalfa plowed under. By that time the soil should be sufficiently rich in humus to permit the paying of more attention to alfalfa hay production. A rotation will then be planned which will allow the alfalfa to remain for several years, and the production of hay will become one of the prime factors.

## ARRANGEMENT OF FIELDS.

At the beginning of the work in 1904 the land was divided by the driveway and old hillside ditches into irregular fields of various sizes. As the work was not started until late in the season, it was impossible to change the arrangement of the fields. This would have delayed the planting, and thus materially interfered with the year's work. Consequently, part of the area now included in the farm was not used at all the first year and part of that used extended beyond the limits of the farm as it stands to-day. In fact, it was not until the third year that it was possible to get the farm laid out into fields of nearly equal size as originally planned and start the regular rotation.

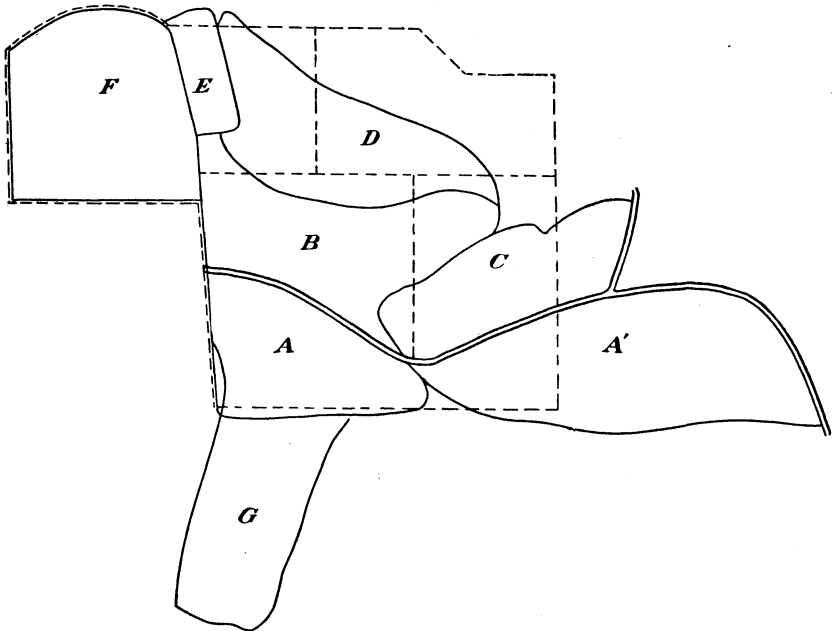


FIG. 1. Diagram of farm, showing arrangement of fields in 1904.

Figure 1 shows the general layout of the farm for the first year. The solid lines show the boundaries of the fields that were cropped in 1904. The broken lines show the rearrangement of the fields and the boundaries of the total area included in the farm since the first year.

Fields A, B, C, and D are to be devoted to the rotation previously mentioned. On field E will be grown sorghum and other crops to be used for soiling or pasture, while field F is a permanent Bermuda pasture, where the hogs can be grazed during wet weather, when their trampling might injure the alfalfa fields. Field G was only included

in the farm the first year. None of the fields is permanently fenced except field A. When a field is to be pastured, it is inclosed by a temporary 26-inch woven wire fence.

Figure 2 shows the arrangement of the hillside ditches at the beginning of this work and during the summer of 1904. These ditches (a, a, a) had been constructed several years before to keep the soil from washing during the heavy rains. They cut the fields up into irregular patches and occupied considerable valuable land that should have been in crops. They were also infested with Johnson grass, and consequently were a source of constant annoyance. In the fall of 1904 it was decided to do away with these hillside ditches and depend upon deep plowing and getting enough humus in the soil to prevent washing. The results of this experiment have so far been highly satisfactory. During the summer of 1905 no washing occurred, although some very heavy rainfalls were recorded. During the torrential rains which occurred in 1906 there were some slight washings, but not enough to do any material damage, while many other lands in the vicinity, even when protected by the hillside ditches, were badly gullied.

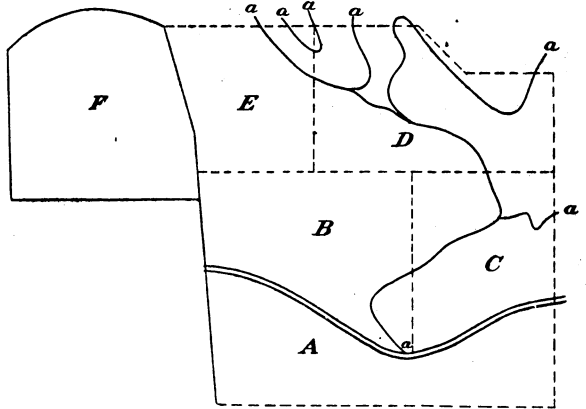


FIG. 2. Diagram of farm, showing the location of hillside ditches in 1904.

### MANAGEMENT OF HOGS.

At the beginning of the work Mr. Munford had on hand 66 head of hogs, ranging in age from 2 weeks to 2 years. These were for the most part grade Berkshires, but a registered Berkshire boar headed the herd. Since that time several pure-bred sows have been added to the herd and the grades gradually killed off, so that now all the animals on hand are pure bred, and the majority are eligible to registry.

The original plan of management was to keep from 12 to 16 brood sows, have the pigs dropped in the early spring, push them through the summer months, and dispose of them when they were 8 or 9 months old. This would undoubtedly have been the most economical practice, as the high price of grain which prevails throughout the Southern States makes it very expensive to carry through the winter

any animals except those wanted for breeding purposes. Unfortunately, however, several of the young sows were permitted to get with pig late in the season, so that each winter there has been quite a number of fall pigs to carry over. This added expense has materially lessened the profits.

#### PASTURE.

The hogs are pastured to some extent every month in the year, alfalfa furnishing most of the pasture. This pasturage is supplemented during part of the summer months with daily feeds of green sorghum, and later, after the corn has been harvested, the hogs have the run of the corn and pea fields and derive considerable nutritious feed from that source. During wet weather, when their trampling might injure the alfalfa plants, they are run on a Bermuda pasture containing some white clover. This Bermuda grass, not being closely grazed during the summer, makes a matted growth which does not all kill down with the early freezes, and therefore furnishes some roughage for the animals during the winter months, though by no means as much as they need.

#### WATER SUPPLY.

The water supply comes from a deep well. The water is raised by means of a hot-air pump and is piped to the troughs in the feeding lots. An automatic device regulates the flow so that the troughs are kept full all the time.

Figure 3 shows the arrangement of the temporary lanes which lead from the feeding lots to the different fields, thus permitting the hogs to have ready access to the water at all times. Lane *a-b* leads from the feeding lots to the lane *c-d*. Field *A* is reached by a run-

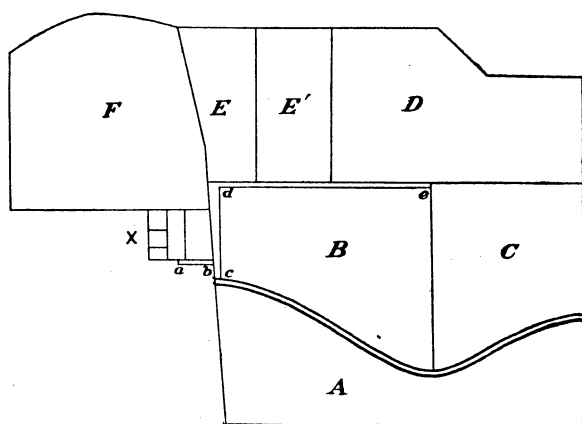


FIG. 3. Diagram of farm, showing arrangement of fields in 1906.

way under a drive at *c*; *B*, by a similar runway under the lane *c-d*, and fields *C*, *D*, and *E* by the lanes *c-d* and *d-e*. This has proved a very satisfactory arrangement. During the long, hot summer days the animals consume an enormous quantity of water, and to attempt to carry this to them, instead of letting them come to the water, would be a very expensive process. Then, again,

when the days are long and hot the hogs graze only during the cool hours of the morning and evening, spending the heated portion of the day in the shade furnished by the trees and sheds in the feeding lots.

#### GRAIN FED AND METHODS OF FATTENING.

Grain is fed during the entire year, not in sufficient quantity to keep the animals fat, but just enough to keep them in a good, thrifty, growing condition. During the winter months they are fed on corn, with occasionally some oats, mill stuff, rice polish, etc. While on alfalfa pasture they receive very little grain, generally not over 1 pound of grain to each hundred pounds the animal weighs. As the time for fattening approaches, the hogs that are to be killed have their allowance increased until they are on nearly a full grain ration. They are then taken from the pasture and kept in the feeding pens and fed all the corn they will consume without waste.

When ready to kill, the hogs are sold alive to the plantation. As the quantity of meat produced has never exceeded that required for the rations supplied to the plantation labor, all the finished animals have each year been turned over to the plantation and the farm credited with the amount they would have brought in the open market.

In discussing the methods of growing and handling the crops each year's work has been dealt with separately. This was thought best to bring out to better advantage the difficulties attending the work at the beginning, the development of better practices of tillage, and the comparative cost of producing crops under the old and newer methods. The tables following the discussion of each year's crops represent actual costs based on daily records kept by Mr. Munford.

In computing the cost of production of the different crops the customary wages paid to day labor has been used as the basis. This is 50 cents a day for a man and the same amount for a mule. A man, two-horse team, and plow or harrow cost \$1.50 a day. This may appear a very low rate to some, but this is the usual rate in this section for this grade of labor. While most of the work was performed by day labor, part was done by farm hands who were getting \$10 a month. The computations, however, were all based on the rate paid to day laborers and no reduction was made for the cheaper month hands. Since all the work was done by labor and tools hired from the plantation, no allowance has been made for depreciation in value of the tools.

In determining the cost of keeping the hogs, all crops fed (pasture excepted) have been charged against their feed bill at the regular market prices. In the case of the sorghum, where there was no market price by which to be guided, a charge of \$2 per ton for the

green forage was made. The cost of producing the cowpeas and peanuts which were grazed off by the hogs was not charged against them but to the field crop account, as it was estimated that the manurial value of these crops would offset what it cost to produce them.

### OPERATIONS FOR 1904.

The acreage of crops grown during 1904 is as follows: Alfalfa, 17 acres; corn and cowpeas, 24 acres; cotton, 10 acres; sorghum, 2 acres; and melilotus, 10 acres. All the land had been in cotton the previous year and, with the exception of that planted to cotton and sorghum and a small area of the corn land which was too wet to plow early, had been plowed during the early winter. This, together with the fact that the work was not started until planting time, prevented the giving of any special attention to the breaking of the land.

#### ALFALFA.

The alfalfa was sown in two fields (*A* and *B*, fig. 1), of 7 and 10 acres, respectively. In preparing for planting, the land previously plowed was disked each way and then harrowed with a smoothing harrow. The seed was sown broadcast at the rate of 25 pounds to the acre and lightly covered with a smoothing harrow. Previous to sowing the seed an application of 200 pounds of cotton-seed meal and 160 pounds of acid phosphate to the acre was made. Field *A* was sown March 19 and field *B* March 24. In both fields an almost perfect stand was secured.

The alfalfa grew rapidly and was cut on June 13, field *A* yielding a total of 7,000 pounds of cured hay, or 1,000 pounds to the acre. This field was then fenced off and from July 14 to September 1 furnished pasturage for 57 head of hogs. This number of animals was not sufficient to keep down the growth, however, so it was necessary to cut the alfalfa again on August 17, when a yield of 1,061 pounds of hay to the acre was secured. Field *B* was cut three times during the season. The first cutting, June 13, gave a yield of 700 pounds of hay to the acre; the second, August 4, 2,374 pounds; and the third, September 19, 1,112 pounds, a total yield of 4,186 pounds of hay to the acre, all secured within five months after sowing the seed.

#### CORN.

The corn land (fields *A'* and *C*, fig. 1), with the exception of a small, low, wet area in *A'* (*a*, fig. 4), had been bedded into rows  $3\frac{1}{2}$  feet apart in the manner customary to the region. These beds were run over with a smoothing harrow and the corn planted April 6 with a one-horse planter. The low, wet area in *A'* was broken with a two-horse turn plow early in April, disked once each way, thoroughly har-

rowed with a smoothing harrow, and planted April 24. The variety planted in both cases was Cocke's Prolific. The first week in May cotton-seed meal at the rate of 200 pounds to the acre was applied at the side of each row with a one-horse fertilizer distributor. Four

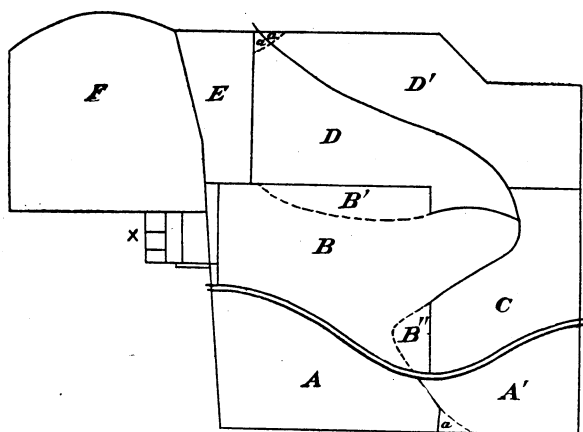


FIG. 4.—Diagram of farm, showing arrangement of fields in 1905.

shallow cultivations with sweeps were given—one in April, two in May, and one in June. At the last cultivation cowpeas were sown ahead of the cultivators at the rate of  $1\frac{1}{2}$  bushels to the acre.

The corn was cut by hand August 16 to 26 and set up in shocks containing about seventy hills

each. In October the ears were snapped from the stalks, and both grain and stover were hauled to the barn and stored. The total yield for the 24 acres was 490 bushels, or a fraction over 20 bushels to the acre.

Forty bushels of the peas were picked and saved for the next year's seed, and the rest were grazed off by the hogs.

#### COTTON.

The cotton land (field G, fig. 1) was plowed into 4-foot beds the latter part of February, harrowed with a smoothing harrow, and planted March 30 to April 4. The soil on this field averaged a little better than the rest of the farm, as it contained more bottom land. The variety planted was Culpeper, and only a fair stand was secured. Five cultivations and three hoeings were given during the season. One cultivation was with a weeder, the rest with 12 and 24 inch sweeps. An application of 200 pounds of cotton-seed meal and 100 pounds of acid phosphate to the acre was made at the side of each row the latter part of May. The picking began September 22 and lasted until November 30. The total yield of lint was 2,650 pounds, or 265 pounds to the acre, and the total yield of seed was 8,350 pounds, or 835 pounds to the acre. Considering the stand secured this was a very good yield.

#### MELILOTUS.

The melilotus was sown primarily as a soil renovator. The land (field D, fig. 1), which had been plowed in December of the previous

year, was run over once with a disk harrow and then with a smoothing harrow. Seed of *Melilotus alba* in the hull was sown March 27 at the rate of 2 bushels to the acre and covered lightly with a smoothing harrow. An excellent stand was secured. The crop was mowed twice during the season. The first cutting, April 22, made a yield of 1 ton of cured hay to the acre, and the second cutting, August 19, made a yield of almost 1½ tons to the acre. This hay was of fine quality and was relished by horses and mules.

### SORGHUM.

Field E, figure 1, which was devoted to sorghum, was plowed April 20, disked once each way, thoroughly harrowed with a smoothing harrow, and planted April 24, 1 peck of seed to the acre being sown in drills 2 feet apart. The variety was Early Amber cane. Two cultivations were given with 15-inch sweeps. The sorghum was utilized as a soiling crop for hogs from September 1 to October 15. The total yield of green forage was estimated at 16 tons.

### RECEIPTS AND EXPENDITURES FOR 1904.

The following tables (Tables 1, 2, 3, and 4) show the cost of production, receipts, and net profit for each crop grown in 1904. Each field is considered separately.

TABLE 1.—*Cost per acre of producing and harvesting crops, 1904.*

Field.	Area, in acres.	Crop.	Cost of preparing land.	Cost of seed, planting, and re-planting.	Cost of fertilizer and applying same.	Cost of cultivation and hoeing.	Cost of harvesting.	Total cost per acre.
A.....	7	Alfalfa (pasture).....	\$1.39	\$4.11	\$2.47	.....	\$1.03	\$9.00
B.....	10	Alfalfa (meadow).....	1.05	3.30	2.04	.....	1.24	7.63
A' and C.....	24	Corn.....	1.17	.76	2.15	\$2.08	1.16	7.32
A' and C.....	24	Cowpeas.....	.....	2.05	.....	.....	.37	2.42
D.....	10	Mellilotus.....	1.30	1.20	.....	.....	1.30	3.80
E.....	2	Sorghum.....	2.50	.92	.....	3.25	4.00	10.67
G.....	10	Cotton.....	1.20	1.96	3.36	a 4.35	3.00	13.87

a Includes ginning, baling, and marketing.

TABLE 2.—*Crop yield, cost, and returns per acre, 1904.*

Field.	Area, in acres.	Crop.	Yield.	Price.	Gross returns.	Cost.	Net returns.
A.....	7	Alfalfa (pasture).....	1.03 tons.....	\$12.00 ton.....	\$12.36	\$9.00	a \$3.36
B.....	10	Alfalfa (meadow).....	2.08 tons.....	12.00 ton.....	24.96	7.63	17.33
A' and C.....	24	Corn.....	20.4 bu. grain.....	.50 bu.....	10.20	7.32	4.04
A' and C.....	24	Cowpeas.....	0.58 ton stover.....	2.00 ton.....	1.16		
D.....	10	Mellilotus.....	b 40 bu.....	.....	.....	2.42	.....
D.....	10	Mellilotus.....	2.23 tons.....	8.00 ton.....	17.84	3.80	14.04
E.....	2	Sorghum.....	8 tons.....	2.00 ton.....	16.00	10.67	5.33
G.....	10	Cotton.....	265 lbs. lint.....	.07½ lb.....	20.04	13.87	12.44
G.....	10	Cotton.....	1835 lbs. seed.....	15.00 ton.....	6.27		

a In addition to pasture.

b Not sold; kept for seed.

TABLE 3.—*Hog record for 1904.*

	Dr.	Cr.
Hogs on hand January 1, 1904:		
66 sows, pigs, and shoats, average weight 75 pounds, at 5 cents.....	\$247.50	
1 boar.....	25.00	
2 gilts, bought in August, at \$20 .....	40.00	
1 sow, bought in September.....	40.00	
2 gilts, bought in October, at \$20 .....	40.00	
72.....	392.50	
Cost of feed for the year.....	539.60	
Receipts for hogs sold.....		\$559.86
96 hogs kept over for 1905.....		502.50
Total.....	932.10	1,062.36
Net profit.....		130.26

TABLE 4.—*Summary of receipts and expenditures for 1904.*

Field.	Crop.	Area, in acres.	Dr.	Cr.	Net profits.
A.....	Alfalfa (pasture).....	7	\$63.00	<sup>a</sup> \$86.52	
B.....	Alfalfa (meadow).....	10	76.30	249.60	
A' and C.....	Corn.....	24	175.68	272.64	
	Cowpeas.....		58.08		
D.....	Melilotus.....	10	38.00	178.40	
E.....	Sorghum.....	2	21.34	32.00	
G.....	Cotton.....	10	138.70	263.10	
Net profit from crops on 63 acres.....			571.10	1,082.26	\$511.16
Hog record.					
Hogs on hand January 1, and expenses.....			932.10		
Hogs on hand December 31, and sales.....				1,062.36	
Net profit from hogs.....					130.26
Total net profit for year.....					641.42
Net profit per acre (including Bermuda pasture).....					8.44

<sup>a</sup> In addition to pasture.

## OPERATIONS FOR 1905.

At the beginning of the year 1905 several changes were made in the arrangement of the fields. (See fig. 4.) While it was still impossible to put into full operation the rotation decided upon, the arrangement of the fields was more in conformity with the original plans. The operations this year were confined to the 52 acres (exclusive of the Bermuda pasture), but as there were some thin, galled portions of this in melilotus (fig. 4, *a*, *a*.), which was used only as a soil renovator, the total area devoted to crops was only 50½ acres, of which 7 acres were in alfalfa pasture, 10 acres in alfalfa meadow, 22 acres in corn and peas, 3½ acres in sorghum, and 8 acres in cowpeas.

**ALFALFA.**

The alfalfa in the 7-acre field, *A*, was again utilized for pasture. On March 28, 115 head of hogs were turned on this field, and on August 2, 8 more animals were added. The pasturing was continued until about the 1st of October.

In the meantime it was found necessary to mow a portion of the alfalfa at two different times, for, as in the previous year, the number of animals was not sufficient to keep the crop grazed down. The entrance to the pasture being at the northwest corner of the field the hogs kept that portion grazed much closer than the rest, and it only required one mowing. The east half of the field was mowed May 12, and yielded at the rate of 2,066 pounds of hay to the acre for the area that was cut over. The second cutting was made on June 20, and a yield of 1,035 pounds to the acre was secured. The west half of the field was cut June 12, the yield being only about 143 pounds to the acre.

In straightening out the lines between the different fields, portions of what were included in *C* and *D* in 1904 were added to *B*. These areas were plowed up and seeded to alfalfa in March, 1905. On the area *B''*, fig. 4, a fine stand was secured, but for some reason it made but little growth during the season. This may have resulted from the fact that the land was broken deeply with a disk plow and had not settled and become firm before the alfalfa was sown. The area *B'* was too wet for alfalfa, and as the land was badly infested with Johnson grass the young seeding was practically all killed out.

Five cuttings in field *B* were secured during the season from the seeding of the previous year, the first and second being much heavier than the other three. The total yield of hay for the year was 4.7 tons to the acre.

**WINTER BARLEY.**

After the corn stover had been removed from fields *A'* and *C* in 1904 the land was broken to an average depth of 8 inches with a disk plow and was sown to winter barley in November. The plan was to utilize this crop as a winter pasture for the hogs. Owing to the lateness of sowing and the very dry weather which prevailed during November and December, the crop never made a satisfactory growth and was of little or no use as a pasture. Could it have been sown a month or so earlier there is no doubt that a large amount of grazing would have been secured, as it made a very rapid growth in the spring after the weather moderated. In March this barley was plowed under with a two-horse turn plow and the land prepared for corn.

## CORN.

The method followed in preparing the land for corn differed materially from that of the previous year. This year the land in field *D* was thoroughly broken with a disk plow to an average depth of 8 inches, that in fields *A'* and *C* having been thus broken in preparation for the barley. The hillside ditches (fig. 2) were all plowed and harrowed down until little evidence of them remained. After breaking, the land was thoroughly harrowed with a smoothing harrow. Instead of running the rows with the contour of the land, as is the usual practice in this section, the fields were marked off in rows 3 feet apart each way and the corn planted in the check. The dates of planting ranged from April 3 to 11, the variety planted being Tennessee Red Cob. Cutworms greatly damaged the stand in field *A'*, making several replantings necessary, and completely ruined that in field *C*, so that the latter field had to be disked, harrowed, and replanted on May 30 and 31. These pests gave no trouble except on the land where the barley was plowed under. Owing to the lateness of this second planting in field *C* a large early-maturing variety of corn known as Mexican June was used.

Four cultivations were given. The first was with a weeder, the second and third with 12-inch sweeps, and the last with double sweeps. The latter implement consists of a double stock to which are attached two sweeps, one 10 and the other 14 inches in width. This is a great improvement over the old-fashioned wide sweep in that it is easier to handle and leaves the ground nearly level.

On the poorer portions of fields *A'* and *D'* nitrate of soda at the rate of 80 pounds to the acre was applied at the side of the row about the middle of May. The first week in June cotton-seed meal at the rate of 100 pounds to the acre was applied in a similar manner to the entire crop on these fields. Field *C* received an application of 200 pounds of cotton-seed meal to the acre the first week in July.

The corn was harvested in the same manner as was the 1904 crop. The yields of corn (all preceded by cowpeas or melilotus) for the different fields were as follows: *A'*, 112 bushels, or 24.89 bushels to the acre; *C*, 137 bushels, or 19.42 bushels to the acre; and *D'*, 331 bushels, or 31.52 bushels to the acre. The uneven stand in field *A'*, resulting from the frequent replantings, and the fact that the Mexican June variety proved to be a comparatively light producer account for the relatively low yield from fields *A'* and *C*.

## COWPEAS.

The latter part of June field *D* was thoroughly pulverized with a disk harrow, and it was sown to cowpeas on July 5, 1½ bushels of seed being used to the acre. Four acres of these cowpeas were cut

for hay August 23, and a yield of 4.49 tons was secured. The remainder of the peas was grazed off by hogs and plowed under for fertilizer.

### SORGHUM.

Field *E* was somewhat enlarged in 1905 and again sown to Early Amber sorghum. The method of preparing the land for planting, the cultivation, and the harvesting were the same as practiced in 1904. The yield was rather light, being only 13.12 tons of green forage for the entire field, or 3.76 tons to the acre. This light yield was undoubtedly the result of planting sorghum after sorghum, a practice which will be guarded against in the future.

### RECEIPTS AND EXPENDITURES FOR 1905.

Tables 5, 6, 7, and 8 show the cost of production, receipts, and net profit for each crop grown in 1905, each field being considered separately.

TABLE 5.—*Cost per acre of producing and harvesting crops, 1905.*

Field.	Area, in acres.	Crop.	Cost of preparing land.	Cost of seed, planting, and re-planting.	Cost of fertilizer and applying same.	Cost of cultivation and hoeing.	Cost of harvesting.	Total cost.
A.....	7	Alfalfa (pasture).....		<sup>a</sup> \$0.62			\$0.41	\$1.03
B.....	10	Alfalfa (meadow).....		<sup>a</sup> .59			3.90	4.49
A' and C....	11½	Winter barley.....	\$1.48	1.29				2.77
A'.....	4½	Corn.....	3.52	1.75	\$3.73	\$1.50	2.71	13.21
A'.....	4½	Cowpeas.....		<sup>b</sup> .11				.11
C.....	7	June corn.....	1.78	.82	2.41	1.45	2.04	8.47
C.....	7	Cowpeas.....		1.25				1.25
D'.....	10½	Corn.....	2.21	.70	3.85	1.33	3.08	11.17
D'.....	10½	Cowpeas.....		.11				.11
D.....	8	do.....	1.12	.24			.48	1.84
E.....	3½	Sorghum.....	2.21	1.26		1.12	3.39	7.98

<sup>a</sup> Cost of resowing thin spots.

<sup>b</sup> Cost of labor in sowing seed.

TABLE 6.—*Crop yield, cost, and returns per acre, 1905.*

Field.	Area, in acres.	Crop.	Yield.	Price.	Gross returns.	Cost.	Net returns.
A.....	7	Alfalfa (pasture)	0.813 ton.....	\$12.00 ton...	\$9.75	\$1.03	<sup>a</sup> \$8.72
B.....	10	Alfalfa (meadow)	4.697 tons.....	12.00 ton...	56.36	4.49	51.87
A' and C....	11½	Winter barley.....				2.77	
A'.....	4½	Corn.....	{ 24.89 bu. grain ..	.50 bu ..	12.45	13.21	1.24
A'.....	4½		{ 1 ton stover ..	2.00 ton...	2.00		
A'.....	4½	Cowpeas.....				.11	
C.....	7	June corn.....	19.58 bu.....	.50 bu ..	9.79	8.47	1.32
C.....	7	Cowpeas.....				1.25	
D'.....	10½	Corn.....	{ 31.52 bu. grain ..	.50 bu ..	15.76	11.17	6.59
D'.....	10½		{ 1 ton stover ..	2.00 ton...	2.00		
D'.....	10½	Cowpeas.....				.11	
D.....	8	do..... <sup>b</sup>	.56 ton.....	12.00 ton...	6.72	1.84	4.88
E.....	3½	Sorghum.....	3.74 tons.....	2.00 ton...	7.48	7.98	<sup>c</sup> .50

<sup>a</sup> In addition to pasture.

<sup>b</sup> Only 4 acres cut for hay, the remainder being pastured and plowed under.

<sup>c</sup> Loss.

TABLE 7.—Hog record for 1905.

	Dr.	Cr.
Hogs on hand January 1, 1905:		
1 boar.....	\$25.00	
9 sows, at \$25.....	225.00	
5 gilts, at \$10.....	50.00	
81 shoats and pigs, average weight 50 pounds, at 5 cents.....	202.50	
1 sow bought in February.....	133.00	
1 sow bought in November.....	40.00	
1 sow bought in November.....	20.00	
99.....	695.50	
Cost of feed for the year.....	551.44	
Receipts for hogs sold.....		\$772.78
109 hogs kept over for 1906.....		690.50
Total.....	1,246.94	1,463.28
Net profit.....		216.34

TABLE 8.—Summary of receipts and expenditures for 1905.

Field.	Crops.	Area in acres.	Dr.	Cr.	Net profits.
A.....	Alfalfa (pasture).....	7	\$7.21	<sup>a</sup> \$68.32	
B.....	Alfalfa (meadow).....	10	44.90	561.60	
A' and C.....	Winter barley <sup>b</sup> .....	11½	31.86		
A'.....	Corn.....	4½	59.44	65.02	
	Cowpeas (pastured).....		.50		
C.....	June corn.....	7	59.29	68.32	
	Cowpeas (pastured).....		8.75		
D'.....	Corn.....	10½	117.28	186.48	
	Cowpeas (pastured).....		1.15		
D.....	Cowpeas (hay and pasture).....	8	14.72	53.76	
E.....	Sorghum.....	3½	27.93	26.18	
			373.03	1,029.68	
Net profit from crops on 50½ acres.....					\$656.65
Hog record.					
Hogs on hand January 1, and expenses.....			1,246.94		
Hogs on hand December 31, and sales.....				1,463.28	
Net profit from hogs.....					216.34
Total net profit for year.....					872.99
Net profit per acre (including Bermuda pasture).....					13.75

<sup>a</sup> In addition to pasture.<sup>b</sup> Winter barley was followed by corn same year.

## OPERATIONS FOR 1906.

In 1906 it was possible for the first time to divide the farm into permanent fields and get the regular rotation of alfalfa, corn, and peas started. Fields A, B, C, and D, figure 3, will now be devoted to this rotation until each field has been in alfalfa for two years. The cropping system will then be changed in order to leave the alfalfa for a longer period before breaking it up. The acreage of the crops this year was alfalfa pasture, 10 acres; alfalfa meadow, 10 acres; corn and peas, 24½ acres; sorghum, 4½ acres; and peanuts, 3 acres.

## CORN.

Figure 3 shows the arrangement of the fields for 1906. Fields *A* and *D* were planted in corn. Part of field *A* was in corn and peas in 1905, while the rest had been in alfalfa pasture two years. That portion of field *A* which had been in alfalfa pasture for two years was broken with a disk plow to an average depth of 8 inches in November, 1905. The continued pasturing had packed the ground so that it was very hard in places and exceedingly difficult to break; consequently, portions of the field were not plowed satisfactorily. Early in April the land was rebroken to a depth of 5 inches with two-horse turn plows and harrowed twice with a smoothing harrow. The remainder of field *A* and all of field *D* were broken with a disk plow.

The corn was planted April 12 to 18 with a check-row planter. The rows were 4 feet apart each way, and from 3 to 4 grains were dropped to the hill. Tennessee Red Cob was the variety planted. The corn was thinned to two stalks in the hill. The stand in field *A* was quite badly injured by cutworms, which made several replantings necessary. This, together with the extra breaking, greatly increased the cost of production.

The east end of field *A*, which was in corn in 1905, was given a dressing of about 4,225 pounds of stable manure to the acre previous to the breaking of the land. Early in June the whole of field *A* received an application of 75 pounds of nitrate of soda to the acre. Later, 125 pounds to the acre of a mixture of 400 pounds of acid phosphate, 25 pounds of kainit, and 100 pounds of cotton-seed meal were applied. Field *D* received a similar quantity of this mixture and 50 pounds of nitrate of soda to the acre.

In harvesting, the yields on the two different portions of field *A* were kept separate in order to note the fertilizing effect of the alfalfa on the crop. The east portion of the field, which had been in corn and peas the year previous and had received a good application of stable manure this year, made a yield of  $32\frac{3}{4}$  bushels to the acre. The rest of the field, which had been in alfalfa for two years, made a yield of 45 bushels to the acre—a fraction over 12 bushels per acre in favor of the alfalfa land. Field *D* yielded at the rate of  $33\frac{7}{8}$  bushels to the acre.

## ALFALFA.

Field *B*, which had been in alfalfa meadow for two years, was utilized for hog pasture in 1906. Ninety-three head of hogs were pastured on the field from March 30 until November 4. The west end of the field was cut for hay twice during the season and the east end three times. The yield from these cuttings was 24,285 pounds, or  $1\frac{1}{2}$  tons per acre.

Field *C* was sown to alfalfa this year. The land was broken deeply with a disk plow in November, turning under the corn stubble and cowpeas that had been grazed off, and then put in fine condition with a smoothing harrow early in February. Previous to the breaking of the land, stable manure at the rate of 7 tons to the acre was applied on the poorer parts of the field. The seed was sown broadcast at the rate of 20 pounds to the acre the 1st of March and lightly covered with a smoothing harrow. A perfect stand was secured. Three cuttings were made during the season. The total yield of cured hay secured was 43,750 pounds, or 2½ tons to the acre.

#### SORGHUM.

Field *E'*, figure 3, formerly a part of field *D*, which was in melilotus and cowpeas in 1905, was this year planted to sorghum. The land was prepared as for corn the latter part of January. The seed was drilled in rows 3 feet apart May 9, 1 peck of Amber cane seed to the acre being used. Thorough cultivation with double sweeps was given. The feeding of the green sorghum to the hogs began July 7 and continued until September 19. The total yield of green forage was a little less than 34 tons, or more than 7½ tons to the acre.

#### PEANUTS.

Peanuts were planted on field *E*. The land was broken with a disk plow the latter part of March and thoroughly harrowed with both disk and smoothing harrows. Planting was done May 10 to 14, 1½ bushels of nuts in hulls being used to the acre. The rows were 3 feet apart. The stand secured was poor, and the crop does not seem to do well on the type of soil in this field (Houston black clay). As the hogs were allowed to do the harvesting, none of the nuts were saved; consequently, no record of the yield was obtained.

#### RECEIPTS AND EXPENDITURES FOR 1906.

Tables 9, 10, 11, and 12 show the cost of production, receipts, and net profit for each crop grown in 1906, each field being considered separately.

TABLE 9.—*Cost per acre of producing and harvesting crops, 1906.*

Field.	Area, in acres.	Crop.	Cost of preparing land.	Cost of seed, planting, and re-planting.	Cost of fertilizers and applying same.	Cost of cultivation and hoeing.	Cost of harvesting.	Total cost.
A.....	12	Corn.....	\$4.63	\$1.34	\$3.48	\$1.16	\$0.97	\$11.58
A.....	12	Cowpeas.....		2.91				2.91
B.....	10	Alfalfa (pasture).....					1.29	1.29
C.....	10	Alfalfa.....	2.40	4.68	2.57		1.58	11.23
D.....	12½	Corn.....	1.79	.51	2.54	2.03	.63	7.50
D.....	12½	Cowpeas.....		2.68				2.68
E.....	4½	Sorghum.....	3.53	.52		.92	2.80	7.77
E'.....	3	Peanuts.....	1.25	3.00		5.06		9.31

TABLE 10.—*Crop yield, cost, and returns per acre, 1906.*

Field.	Area, in acres.	Crop.	Yield.	Price.	Gross returns.	Cost.	Net returns.
A.....	12	Corn.....	39.67 bu....	\$0.50 bu....	\$19.83	\$11.58	\$8.25
A.....	12	Cowpeas.....				2.91	
B.....	10	Alfalfa (pasture).....	1.214 tons..	12.00 ton..	14.57	1.29	<sup>a</sup> 13.28
C.....	10	Alfalfa (meadow).....	2.187 tons..	12.00 ton..	26.24	11.23	<sup>b</sup> 15.01
D.....	12½	Corn.....	33.72 bu....	.50 bu....	16.86	7.51	9.35
D.....	12½	Cowpeas.....				2.68	
E.....	4½	Sorghum.....	7.55 tons...	2.00 ton...	15.10	7.77	7.33
E'.....	3	Peanuts.....				9.31	

<sup>a</sup> In addition to pasture.<sup>b</sup> Seeded in March, 1906.TABLE 11.—*Hog record for 1906.*

	Dr.	Cr.
Hogs on hand January 1, 1906: —		
1 boar.....	\$25.00	
1 sow (pure-bred Berkshire).....	133.00	
9 sows, at \$25.....	225.00	
5 sows, at \$15.....	75.00	
93 shoats and pigs, average weight 50 pounds, at 5 cents.....	232.50	
109.....	690.50	
Cost of feed for the year (estimated).....	954.85	
96 hogs kept over for 1907.....		\$777.25
Receipts for hogs sold.....		1,239.50
Total.....	1,645.35	2,016.75
Net profit.....		371.40

TABLE 12.—*Summary of receipts and expenditures for 1906.*

Field.	Crop.	Area, in acres.	Dr.	Cr.	Net profits.
A.....	{Corn.....	12	{	\$237.96	
	{Cowpeas (pastured).....				
B.....	Alfalfa (pasture).....	10	{	<sup>a</sup> 145.70	
C.....	Alfalfa (meadow).....	10	{	<sup>b</sup> 262.40	
D.....	{Corn.....	12½	{	210.75	
	{Cowpeas (pastured).....				
E.....	Sorghum.....	4½	{	67.95	
E'.....	Peanuts.....	3	{		
				489.34	
Net profit from crops on 52 acres.....				924.76	\$435.42
Hog record.					
Hogs on hand January 1, and expenses.....			1,645.35		
Hogs on hand December 31, and sales.....				2,016.75	
Net profit from hogs.....					371.40
Total net profits for year.....					806.82
Net profit per acre (including Bermuda pasture).....					12.41

<sup>a</sup> In addition to value of pasture.<sup>b</sup> Seeded in March, 1906.

### FUTURE PLANS.

As previously mentioned, the present rotation will be run only until a crop of alfalfa has been plowed under on each field. After that a cropping system will be planned which will allow the alfalfa to remain three or four years before it is broken up. This will probably necessitate bringing field *E* into the regular rotation and taking in an additional field for growing sorghum, etc. A five-year rotation of alfalfa, corn, and cowpeas can then be adopted. The alfalfa can be left on the field three years, two years for meadow and one year for pasture. It will then be broken up and put in corn and cowpeas for two years.

One of the greatest drawbacks to the present system is the lack of an abundance of pasturage from the middle of December to the middle of March. Plenty of grazing at this time of the year would greatly lessen the quantity of grain required for wintering the animals that are kept over, and this would correspondingly reduce the cost of pork production. To meet this demand for winter grazing an additional area of 10 acres was added to the farm in the fall of 1906. This was very poor worn-out land which had not been cropped for several years. It will be used almost exclusively for growing annual pasture crops. Rye was sown on this field in September. This will be used for pasture until spring, then plowed under, and the land planted to cowpeas and peanuts. Part of the cowpeas will be harvested for seed, and the remainder, together with the peanuts, will be grazed off by the hogs. Vetch was sown with the rye on 1 acre of this land. If this crop succeeds it will be sown with the rye in the entire field in the autumn. This plan of cropping will be continued until the land becomes sufficiently fertile to grow a greater variety of crops.

### CONCLUSION.

The results of the three years' work indicate quite clearly that this method of diversified farming can be made profitable throughout the Southern States in regions where alfalfa can be grown successfully.

The average net profit per acre for the three years is \$11.37. This is for the whole farm, including the Bermuda pasture, which was used very little. This, however, does not allow for any rent of land. If \$3 an acre were deducted for rental, the profit would be cut to \$8.37 per acre. While this might seem rather low on land valued at \$150 to \$200 an acre, still it is over 41 per cent on the \$20 an acre valuation placed on the land described. It must also be remembered that during these three years more attention was given to increasing the fertility of the land and getting it in a good state of cultivation than to securing large yields. The work of increasing the depth to which

the land is broken, plowing down the hillside ditches, etc., added materially to the cost of production and correspondingly reduced the profits. For example, alfalfa has been used in a short rotation, which allows it to stand only two years. While this suits the purpose so far as soil improvement is concerned, it does not show to best advantage the possibilities of alfalfa as a profitable hay crop. The returns from field *B* in 1905, when a net profit of over \$51 per acre was realized from this field, give some idea of what may be expected when the production of alfalfa hay becomes one of the features of the farm. This was only the second year for the alfalfa on that field, and it would no doubt have given even better returns the third and fourth years.

In connection with the alfalfa work, it has developed that the brown and reddish brown soils are not nearly so well adapted to this crop as the black and gray soils. As a rule, no trouble is experienced in getting a stand on the latter soils, while it is frequently very difficult to secure a perfect stand on the former. This is due in part to the fact that crab-grass is persistent on the brown and reddish brown soils.

It is to be regretted that weights could not have been taken to show the actual gains made by the hogs while on the alfalfa pasture. While they thrived and made good gains on this pasture, there are no data to determine its actual value as a meat producer. The results for 1906, however, show that a well-set alfalfa field the second year from sowing will furnish pasture for 12 to 15 head of hogs to the acre for six months—say, from the 1st of April to the 1st of October—and at the same time produce  $1\frac{1}{2}$  tons of hay to the acre. Of course, if no hay were cut a few more animals might be grazed, but as the mowing improves the pasture this plan is to be preferred to pasturing enough hogs to keep the alfalfa grazed close all the time.

One of the most interesting things brought out in the records of the corn production is the difference in the cost of cultivation and hoeing under the different methods practiced. The first year, when the rows were laid out with the contour of the land and cultivated only one way, the cost of cultivation averaged \$1.38 per acre and the cost of hoeing 70 cents per acre. In 1905 and 1906, when the corn was check-rowed and cultivated both ways, the average cost of cultivation and hoeing was reduced to \$1.10 and 21 cents, respectively, a saving of 20 per cent in the cost of cultivation and 70 per cent in the cost of hoeing. Practically all the hoeing necessary under the check-row method was where the old hillside ditches had been. Here the Johnson grass had gained a foothold and gave considerable trouble.